THE SCIENTIFIC RELATIONS OF GERMANY, FRANCE, AND ENGLAND

THE following extracts from M. Berthelot's recent excellent article in the *Temps*, on the Relations which should exist between Germany and France, are taken from a recent number of the *Pharmaceutical Journal* :—

We know that modern civilisation depends upon three nations, which should at all times and at any cost remain united—namely, France, Germany, and England, each with its peculiar genius and its share in the historic development of the human race. From the seventeenth century each of these nations has taken an active and prominent part in the progress of science.

To speak first of physical and mathematical sciences. Though the initiative was due principally to a few men of other countries —Galileo, an Italian, and Copernicus, a Pole, being the founders of modern astronomy and mechanics—yet the development of these sciences was concentrated chiefly in France, Germany, and England. In France, Descartes discovered the methods of geometric analysis, which have proved more durable than his philosophical and cosmogonical theories. In Germany, Kepler invented the laws of planetary movement; and Leibnitz, who by education and the clearness of his conceptions was perhaps more French than German, laid down the rules of the differential calculus under a form in which they still exist amongst us. At the same time, England produced Newton, greater, perhaps, in the science of nature than either Descartes, Kepler, or Leibnitz; for Newton discovered both new methods of calculation and the laws of astronomy, and since his time we have scarcely done more than develop his ideas and doctrines in studying the movement of the stars.

This same concourse of the three great nations of modern times is seen also in the foundation of chemical science, which in the present day plays so important a part, whether it be in the theories relative to atoms and the constitution of matter, to the formation of stars and of the successive layers of the terrestrial globe, to the origin of life itself; or, on the other hand, in the applications of human industry, dealing with metals, colouring matters, remedies, agriculture, and manufactures.

Towards the end of the eighteenth, and at the commencement of the nineteenth centuries, chemistry was established upon a durable basis, after having floated during nearly two thousand years amongst mystical, obscure, and incoherent notions. It was a Frenchman, Lavoisier, who fixed these indecisive ideas, by the definite principle of the stability of matter, invariable in the nature and weight of its simple bodies. Perhaps, as has been asserted, Lavoisier did not discover any particular fact; but, according to Aristotle, principles and causes are things which are of more scientific importance, for by them we arrive at other knowledge. Now Lavoisier discovered the fundamental principle of chemistry; the science dates from him.

Is this saying that Lavoisier divined all, perceived all, traced for all time the plan of chemical science? Not at all; no more than that Newton alone founded astronomy. For this the inevitable concourse of the great nations was required. Whilst Lavoisier published his immortal researches, the English Priestley and Cavendish discovered the principal gases and the nature of water—inventions that were seized immediately by Lavoisier to support his theory. The Swedish Scheele brought also his precious contingent to the common work. Some years afterwards, an Englishman of genius, Humphry Davy, completed the edifice by the discovery of the alkaline metals, which he obtained by the application to chemical decompositions of the pile recently discovered by a great Italian, Volta.

Germany equally marked its place in the foundation of the new science. It was in the law of numbers that its work was principally characterised: Richter, Wenzel, and the great Berzelius (a Swede) established the law of chemical equivalents, that is to say, a law as general and as absolute in chemistry as the law of Newton in astronomy. It is remarkable that the part of the Germans in this discovery has been principally experimental and practical, contrary to the opinion generally received of German genius. On the contrary, the atomic theory, properly so-called, of a character more abstract and more litigious, is due to an Englishman, Dalton; whilst its demonstration by the physical study of the gases has been accomplished by a Frenchman, Gay-Lussac. This shows that the geniuses of the European races are not so different as has been asserted. Give them a common and equally high culture, and from each will proceed inventions equally original.

This conjunction of Germany, France, and England is to be seen in every great epoch in the history of modern science. The demonstration could be carried down to the present time, proving that neither of these three nations has degenerated from its past: the doctrine of substitutions, the theory of the ethers, that of the polyatomic alcohols, dissociation, the idea of organic ferments, the methods of synthesis of organic principles, have been principally established by French discoveries; the theory of the radicals and that of the polyatomic elements are rather to be attributed to German discoveries; whilst the electro-chemical theory and the method of double decompositions have been invented in England. Finally, the great doctrine of the equivalence of the natural forces, more particularly designated under the name of the mechanical theory of heat, was first discerned by a German, Mayer, and an Englishman, Joule. Developed afterwards by a German mathematician, it has been established in chemistry principally by the experiments of French, English, and Danish scientific men. But it would not be wise to dilate upon the science of the present day; we are too near to it, and are too much engaged in it, for any estimate to escape suspicion of partiality.

In looking back over this short sketch of the progress of the science with which I am best acquainted, I would not ignore the part of Italy, which in the past was so great (may it resume its importance in the future!), nor that of the United States, nor of Russia. But, I repeat, the initiative of the ideas and discoveries has rested for more two centuries in the bosom of three nations —English, French, and German. Their union and their reciprocal sympathy is indispensable, under the penalty of a general loss to civilisation.

INSTRUCTIONS FOR PREPARING BIRDS' EGGS *

I WISH to say a few words for the benefit of those engaged in collecting öological specimens.

Twenty years ago all eggs were blown with two holes—one at each end, and until within ten years most eggs have been emptied with two holes as above, or at the side. Very many of the eggs which I now receive in my exchanges are similarly prepared. At the present time no experienced collector ever makes but one hole to remove the contents of the egg, using a blowpipe in some form to accomplish this object. The following rules should invariably be followed:—

1. Prepare your eggs neat and clean. There is no excuse for having a dirty set of eggs where water, soap, and a tooth-brush can be found. Some eggs will not bear washing, as the shell is so calcareous that the characteristic markings will wash away. There are, however, but few of this class, and I believe this peculiarity is confined to the water-birds. You can see it in any of the species (Smithsonian Catalogue) from 615 to 628 inclusive, and also in the eggs of the Grebes and Flamingo, and some others. Having once seen it you will never mistake it for anything else.

2. Make but one hole, and that a small one in the middle of the egg; cover this hole, when the contents are removed, and the specimen is dry, with gold-beater skin or the paper number indicating the bird. Use an egg drill or a pointed wire of four or six sides to make the opening.

3. If the blowpipe does not readily remove the contents of the egg, inject water and shake the specimen thoroughly, then blow again, and repeat the operation until every particle of the egg is removed.

4. If the embryo is too far advanced to remove through a moderate sized hole, blow out what you can of the liquid part and fill the egg with water, wipe it dry and put it away in a covered box in some warm place, and every twenty-four or forty-eight hours shake it well and remove what you can, and then refill with water. Repeat this operation several times, and after a few days the contents will become sufficiently decomposed to take away.

5. After removing the contents of any egg, cleanse the shell thoroughly. Fill it with clean water and shake vigorously, blow out the contents and repeat the operation until the specimen is perfectly clean. This is particularly desirable in white eggs, as black spots will show through the shell after a time if the least particle of the egg or blood stains remains inside.

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6. Save all your eggs in sets—that is, keep all the eggs each bird lays by themselves. This is the only way to form a correct knowledge of the eggs of any species, as a single egg, particularly of the blotched ones, frequently gives a very erroneous idea of the general markings—a very unsatisfactory representative of a set. For instance, in my collection are four eggs of the *Buteo lineatus*, found in the same nest, two of which are pure white and two blotched. It is not very uncommon to find great variations in markings in the same species and in the same nest.

7. Keep a memorandum of the place and date of collecting each set of eggs.

8. Use some kind of blowpipe in preparing your eggs for the cabinet. The common blowpipe, with the addition of a fine pointed tip, will answer; yet it is a severe tax on the lungs and brain if you have many eggs to blow. I have many a time been dizzy and almost blind from overtaxing my lungs in this operation. Within a few years Mr. E. W. Ellsworth, of East Windsor Hill, Conn., has invented a blowpipe which is operated by the thumb and finger, which works very perfectly and expeditiously. I would not be without it on any account. After using it for a time, and then letting it remain unused until the leather packing becomes dry, the instrument does not work satisfactorily to those unaccustomed to it. The remedy is simple. Take off the blowpipe and work the instrument submerged in a bowl of warm soap suds, when the leather packing becomes pliable and works as well as new. I have used the same instrument for years, and it works to-day as well as when new, by following the above directions. The printed directions which accompany each instrument are intended to be a sufficient guide in case repairs are needed, and the maker can be referred to for any further information required.

SCIENTIFIC SERIALS

THE *Geological Magazine* for May (No. 95) opens with an important article (illustrated with a plate) on some coniferous remains from the Lithographic Stone of Solenhofen by Mr. Dyer, in continuation of a former paper on the same subject. This paper includes the description of a new species of *Pinites* (*P. solenhofenensis*), a revision of the genus *Athrotaxites*, with descriptions of two new species (*A. longirameus* and *A. ? laxus*), and a notice of a new genus, *Condylites*, probably belonging to the Cupressine group, and including a single new species, *C. squamatus*.—MM. H. B. Woodward and J. H. Blake communicate a valuable paper on the relations of the Rhætic beds to the Lower Lias and Keuper formations in Somersetshire, in which they cite additional evidence and arguments in support of the view that the Rhætic beds constitute true passage-beds between the Keuper and Liassic series.—Principal Dawson gives us the results of a new examination of the geological structure of Prince Edward's Island in the Gulf of St. Lawrence; and Mr. Alfred Bell a paper on the succession of the Crags, the latter containing a criticism of Mr. Prestwich's recently-published memoirs on the same subject.—Mr. James Geikie communicates a sixth paper on changes of climate during the glacial epoch, and the number concludes with an interesting lecture on meteorites by Mr. David Forbes.

THE *Monthly Microscopical Journal*, No. 42, for June, completing the seventh volume, contains communications on "An Improved Reflex Illuminator for the Highest Powers of the Microscope," by W. H. Wenham; on "A Silvered Prism for the Successive Polarisation of Light," by J. W. Stephenson; "Structure of Battledore Scales," by J. Anthony, M.D., detailing fresh investigations by a new method of of illumination, the results of which confirmed those of a previous communication; "Beale's Nerve Researches: the Reply of Dr. Beale to Dr. Klein;" "On Bog-Mosses," by R. Braithwaite, M.D., part iv., devoted to *Sphagnum tenellum* Ehrh., and its varieties. This is the *S. molluscum* of Wilson's "Bryologia;" "Crystallisation of Metals by Electricity," by Philip Braham; "On the Means of Distinguishing the Fibres of New Zealand Flax from those of Manilla or Sizal, by the Microscope," by Captain Hutton. The average length and diameter of the ultimate fibres are held to be distinctive, as well as some other less important points, in the discrimination of these fibres. The residue of this number is occupied, as usual, with brief notices of new books, notes on microscopical subjects, and the proceedings of microscopical societies.

SOCIETIES AND ACADEMIES

LONDON

Geological Society, June 19.—Prof. Ramsay, V.P., in the chair.—The following communications were read:—1. "On *Trochocyathus anglicus*, a new species of Madreporaria from the Red Crag," by Mr. P. Martin Duncan, M.B., F.R.S. The author described a coral, of which a single specimen had been found in the Red Crag, in the grounds of Great Bealings Rectory, Norfolk. He stated that it belonged to the genus *Trochocyathus*, and was distinguished from the other species of that genus by its dense epitheca, its small and prominent columella, and its inverted calicular margin. He proposed to name it *Trochocyathus anglicus*, and stated that its nearest alliance is with the Australian Upper Tertiary form described by him under the name of *T. meridionalis*. Mr. Prestwich inquired whether the fossil bore any resemblance to any of the French Eocene forms, and whether there was any possibility of its being derivative. Prof. Duncan replied that the specimen was but little worn, and was therefore probably not *remanié*, though this point was not absolutely certain. 2. "On the Discovery of Palæolithic Implements in association with *Elephas primigenius* in the High-terrace Gravels at Acton and Ealing," by Colonel A. Lane Fox, F.G.S. The gravels in the neighbourhood of Acton have been divided by Mr. Prestwich into two principal groups—viz., the high-level gravels on the hills above the valley, and the valley-gravels on the sides and bottom of the valley itself. The valley-gravels have been again divided by Mr. Whitaker into three terraces—viz., a high terrace, between 50ft. and 100ft. above the Ordnance datum, a mid terrace, between 20ft. and 40ft. high, and a low terrace, at an average height of 10ft., occupying the low ground in the bends of the river. On both sides of the river the high terrace is separated from the mid terrace by a strip of the London Clay, which is laid bare at an average level of 50ft. The London Clay is also laid bare on the sides of the tributary streams running into the valley on both sides of the river, thus dividing the high-terrace gravel into patches. The mid terrace is continuous, and follows the sinuosities of the valley on both sides up to the strip of London Clay. The author accounts for this distribution of the gravels by supposing that a large body of water must at one time have stood at the 50-feet level, and the denudation of the high terrace have been caused by the waves beating on the sides of the valley, and by drainage into this body of water. The mid terrace he conceives may have been caused in part by accumulations beneath this body of water. The position of the high-terrace gravel at Acton corresponded so closely to that of the implement-bearing gravels of the Somme and the Ouse that the author was led to examine carefully the excavations made in it for the construction of houses. He discovered a number of implements of the drift-type, together with flakes and cores, and a few roughly-formed scrapers; all these were found in close contact with the London Clay, and beneath the gravel. Fragments of fern (*Osmunda regalis*) and of wood (*Pinus sylvestris*) were also found with the implements at the same level. Two implements were found at Ealing Dean, two miles westward, on nearly the same level as those at Acton—viz., 90ft.; and these also came from the bottom of the gravel. Another implement was found south of the river at Battersea Rise, in the same position above the strip of London Clay as at Acton, and at about 60ft. above the Ordnance datum. The implements are of the pointed and oval types. The only animal remains discovered in the high terrace consisted of a tooth of *Elephas primigenius* in the Acton gravel. The position of this the author believes to be reliable, although he did not discover it himself *in situ*. In the mid-terrace gravel a number of pits were examined between Shepherd's Bush and Hammersmith, and in the neighbourhood of Turnham Green, which resulted in the discovery, at the latter place, of a large quantity of animal remains (noticed by Mr. Busk in the following paper), all of which, like the implements of the high terrace, were at the bottom of the gravel; but no evidence of human workmanship was found in the mid terrace. All these were found together, in the same seam of gravel, 12ft. beneath the surface, and all appeared to have been deposited at the same time. The surface was here 25ft. above the Ordnance datum, and consequently about 50ft. lower than the implements of the high terrace, 1½ mile to the north. The section across the valley, taken through the two places, here shows the strip of the London Clay intervening between the two terraces. The chief points of interest which the author submitted to the judgment of geologists consisted in the presence of drift imple-

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